

## Challenges for Managing Rangelands under Changing Climate in Arid Regions Challenges for Managing Rangelands under Changing Climate in Arid Regions

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Realizing that human activities are responsible for the continued global climate change that threatens societal sustainability, it is critically important that humans adapt strategies that allow a transition from a parasitic past to a commensal and ideally to a mutualistic future, in order to survive and thrive. The grand challenge facing humanity is to develop and implement viable and practical adaptation strategies and plans. This requires knowledge of how natural and human systems are coupled and how the components of each system interact. Acquisition of that knowledge requires the integrated study of human societies, ecosystem services and functions, and climate change, which can inform the development of effective adaptation strategies and policy implementation. Dryland ecosystems are sensitive and therefore vulnerable to climate change but nations primarily relying on rangelands ecosystem services are often least prepared for risks associated with extreme climate events. In this presentation, examples from different dryland case studies will be presented to highlight the challenges and effective management practices. The lessons learned from these case studies suggest that a system approach need to be developed to holistically mainstream climate concerns into development and management plans and strategies. The questions remained include how to scale up from local findings to national or regional levels. Although it is well-known that coupled human and environment systems vary with spatial and temporal scales, most of our basic scientific knowledge comes from small spatial studies conducted over short time periods. There is a critical need to conduct systems-oriented research on Coupled Human and Environmental MacroSystems (CHEMS) in order to understand and forecast the consequences of climate, land use and socioeconomics at regional to continental scales. Based on our CHEM concept, this synthesis paper aims at elucidating key commonalities in environmental sustainability across selected regional and continental scales.

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